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$\triangle a=14$, $\triangle^2 a=6$, $\triangle^3 a=0$. $\therefore$ $S=11n+\binom{n}{2}14+\binom{n}{3}6=n(n^2+4n+6)$, or $n[(n+2)^2+2]$.

III Solution by A. C. ROBERTS, Long Bottom, Ohio; C. E. WHITE, Trafalgar, Indiana; and OTTO GECKELER, Bloomington, Indiana.

Here $S=n[(n+2)^2+2]$, and this formula is derived as follows:

The series $11+25+45+71+103+141+185+\ldots.$ consists of the sum of two series as follows:

1st $11[1+2+3+4+\ldots.+n]$ whose sum $=11\left(\frac{n(n+1)}{2}\right)$

2d $3[1+4+3^2+16+5^2+\ldots.+(n-1)^2]$ whose sum $=\frac{1}{2}[n(n-1)(2n-1)]$.

$\therefore$ the entire sum $=\frac{11}{2}[n(n+1)]+\frac{1}{2}[n(n-1)(2n-1)]=n^3+4n^2+6n$.

$$n^3+4n^2+6n=n[n^2+4n+6]=n[(n+2)^2+2].$$

IV. Solution by OTTO CLAYTON, A. B., Indiana University, Bloomington, Indiana, and JOHN B. FAUGHT, Bloomington, Indiana.

Making a table as follows:

$$11+\left\{\begin{matrix}11\\14\end{matrix}\right\}+\left\{\begin{matrix}11\\14\\14+6\end{matrix}\right\}+\left[\begin{matrix}11\\14\\14+6\\14+6+6\end{matrix}\right]+\left[\begin{matrix}11\\14\\14+6\\14+6+6\\14+6+6+6\end{matrix}\right],$$

we see that the nth or general term is $11+(n-1).14+\frac{(n-1)(n-2)}{2}.6$

$$S_n.=11n+\Sigma_1^{n-1}(n-1).14+\Sigma_1^{n-1}\frac{(n-1)(n-2)}{2}.6=11n+\frac{n(n-1)}{2}.14+\left\{n-2+\frac{(n-2)(n-3)}{2}.2+\frac{(n-2)(n-3)(n-4)}{6}\right\}.6=n(n^2+4n+6),\text{ or, } n[(n+2)^2+2].$$

V. Solution by W. WIGGINS, Richmond, Indiana, and the PROPOSER.

By inspection, the general term $U^n=3n^2+5n+3$.

Now take another series whose general term $V_n=n^3+(n-1)^2+3n$.

$\triangle V_n=[(n+1)^3+n^2+3(n+1)]-[n^3+(n-1)^2+3n]=3n^2+5n+3=U_n$.

By Chrystal, Chapter XXXI, Sec. 3, $\Sigma_{n=1}^{n}U_{n+1}=V_n-V_s\Sigma_{n=1}^{n}=U_n=V_n+1+V_1$ $=(n+1)^3+n^2+3(n+1)-4=n^3+4n^2+6n=n[n+2)^2+2]$.

PROBLEMS.

34. Proposed by ROBERT J. ALEY, A. M., Professor of Mathematics, Indiana University, Bloomington, Indiana.

$$\Sigma_1^n\frac{(n+2)^2}{n(n+4)}=\text{what?}$$

35. Proposed by COOPER D. SCHMITT, A. M., Professor of Mathematics, University of Tennessee, Knoxville, Tennessee.

Prove that the product of two numbers, each the sum of (4) squares may be expressed as the sum of four squares in 48 different ways and unite some or all of the 48 ways.

Solutions to these problems should be received on or before December 1st.